

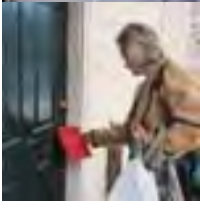
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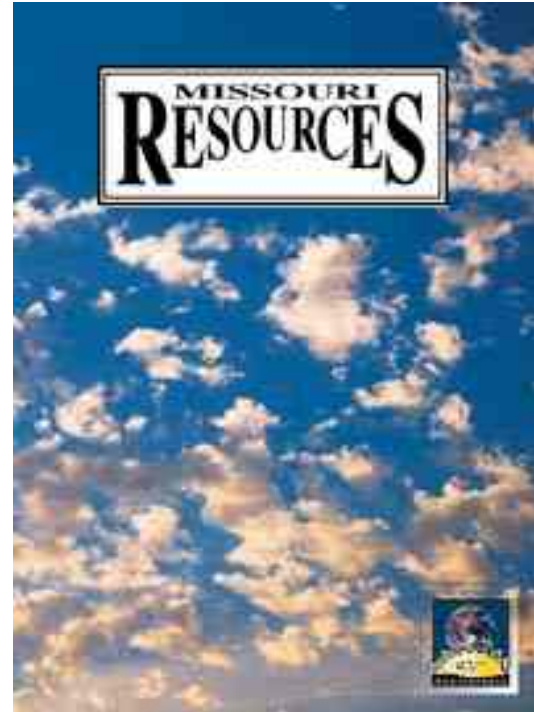
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Comments from the Director:

Fortunately, we were all once kids. As kids, we often got mixed up in activities that we probably shouldn't have. It's a kid's nature to be naughty, and I had my share of opportunities.



Although I can't remember every dastardly deed, nor what happened to me, I do remember the words of wisdom that were offered on those occasions. In fact, Barney from the old Andy Griffith Show used to say it all the time: "Nip it in the bud." A politely spoken, but firm warning to me to get my act together.

As an adult, I still hear that warning. Now, it's me warning myself to cool my jets or stifle that negative thought. It makes for more productive discussions and meetings if I can help maintain a relaxed atmosphere until a satisfactory compromise or resolution is reached.

As director of DNR, I've also found that it is helpful to apply that principle to the way that we do business. This agency always has a lot of diverse issues "in the hopper." Because of that, there usually is a lot of external discussion about what we are or are not doing. Sometimes the information is on the money, and sometimes it's not at all correct. It is critical that Missourians know what we are doing and why we are doing it. In an effort to "nip" a few misconceptions "in the bud," I'd like to highlight a few of our current, high-profile activities.

Enhanced Inspection and Maintenance Program (I/M)

For the past several years, residents in St. Louis and the surrounding areas have had a problem with healthy air. Recently, we made a big stride in cleaning up that air when we selected a contractor (Environmental Systems Products Inc.) to build and operate improved vehicle emissions testing stations in the St. Louis metropolitan area (see story on page 9). We hope to have I/M up and running by the spring of 2000. The program will offer the benefits of improved and healthy air and customer convenience.

Impaired Waters List – 303d

You have probably heard about this 303d list. Under the federal Water Pollution Control Act (section 303d), states are required to identify waters for which existing required pollution controls are not stringent enough to implement state water quality standards. There is controversy about whether we went too far or not far enough. DNR compiled its list, and submitted it to the U.S. Environmental Protection Agency. EPA responded by suggesting that we add five additional water bodies and also put 10 waters back on the list that were taken off in 1996. The public comment period for EPA's suggestions ran until March 2. Comments are currently being reviewed.

Water Pollution Control Fees

We are working with industry to address serious funding shortfalls in our water pollution control permitting area,

and to extend the sunset date on these fees from December 2000 to December 2005. Due to a lawsuit, an increase in the number of new permits and a move to offer quicker, more standardized permits, this program has experienced a significant funding deficit. Currently, a work group is analyzing some alternative proposals.

I could use half of Missouri Resources to address issues we're involved in, but you'd miss some interesting and worthwhile stories. With that in mind, I welcome your comments at: Missouri Department of Natural Resources, Public Information Program, P.O. Box 176, Jefferson City, MO, 65102 or send me an e-mail at moresdnr@mail.dnr.state.mo.us

A handwritten signature in black ink, reading "Steve Mahfood". The signature is written in a cursive, flowing style with a large initial "S" and a long, sweeping underline.

Steve Mahfood
Director, Missouri Department of Natural Resources

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AIR: THE LAST 25 YEARS

During 1999, the Missouri Department of Natural Resources (DNR) will be celebrating its 25th anniversary. In commemoration, *Missouri Resources* will be presenting a "retro look" at four areas of interest and importance to Missouri citizens.

We start the year with, "Air," as seen through the eyes of DNR's divisions of Environmental Quality, Energy, and the Environmental Improvement and Energy Resources Authority. These are the people who have spent the last quarter century

working to protect and improve our air. Hopefully, some day, every Missourian will be able to take clean air for granted. This department does not view clean air as a commodity, but rather, a natural resource to which we all are entitled.

Missouri Air: a 25-year retrospective

by Kerry Cordray

Division of Environmental Quality

America's air keeps getting cleaner. A new pollution report from the U.S. Environmental Protection Agency (EPA) shows that in 1997, the nation's air was the cleanest since the federal government started measuring major air pollutants in 1970. According to EPA, from 1970 to 1997, overall emissions of six major pollutants – carbon monoxide, nitrogen oxides, hydrocarbons (or volatile organic compounds), soot (particulate matter), sulfur dioxide and lead – decreased 31 percent. This came at a time when vehicle-miles traveled in the United States increased 127 percent and the gross domestic product increased 114 percent.

In DNR's 25-year history, Missouri's air quality has also improved. One measure of improvement is when a polluted area cleans up and meets a health standard. When DNR was formed in 1974, both Kansas City and St. Louis were annually missing the mark on standards for ground-level ozone (smog), St. Joseph and the Kansas City area were "nonattainment areas" for particulate matter, and St. Louis could not meet carbon monoxide standards. Missouri also had lead problems that had been linked to smelters near Herculaneum, Buick and Glover.

Fast forward to 1999 and you will find that Kansas City and St. Joseph have now met standards for particulates and St. Louis has not had a carbon monoxide violation since 1987. All lead smelters but Herculaneum now meet the health standard for lead, and DNR is working with that facility to develop more effective controls. Kansas City has met the ozone standard since 1992. St. Louis is moving steadily toward meeting the ozone standard. A major new improvement in vehicle emission inspections is underway to help address that problem.

Air quality achievements have not been limited to urban areas. In 1997 charcoal manufacturers, the Department of Natural Resources, EPA and concerned citizens came together to end the charcoal industry's exemption from air regulations. The Missouri charcoal industry now is making a major investment in pollution control equipment.

EPA estimates that industry improvements will prevent the emission of 100 million pounds of pollutants over the next seven years.

While it is true that the state's air is getting cleaner, there still is important work to be done. In January and February, DNR held three public hearings to gather comments on a proposal to control odors from the state's largest Concentrated Animal Feeding Operations (CAFOs).

To combat the summer smog in the big cities, this summer a cleaner-burning gasoline called reformulated gasoline (RFG) will be introduced in the St. Louis area. RFG has also been recommended for introduction in Kansas City in 2000.

Other air quality challenges that continue to face DNR include meeting new stricter standards for smog, soot and fine particulates. These standards recently were revised when an EPA review showed that changes were necessary to better protect public health. New limits also are coming for hazardous air pollutants, chemicals that may cause extreme health effects such as cancer or reproductive disorders. Missouri also must meet new federal regulations to cut down emissions of nitrogen oxides, helping other states to meet the ozone standard.

Perhaps the greatest accomplishment of the past 25 years is that current surveys show Missourians are becoming more and more aware of the direct correlation between their personal health and the quality of the air they breathe.

Cleaner Energy, Cleaner Air

by Jim Muench

Division of Energy

Twenty-five years ago, the vital relationship between energy use and the environment was not the paramount concern. Maintaining the energy supply and lessening our country's dependence on foreign oil were the issues of the day.

In 1973, the nation was mired in an overheating economy, the Vietnam War, and the Watergate scandal. Anxiety about pollution led to the formation of the U. S. Environmental Protection Agency in 1970 – but few people worried about energy supplies or availability.

That soon changed. Two weeks after the Yom Kippur War began in October 1973, the Organization of Petroleum Exporting Countries (OPEC) launched an oil embargo to punish the United States for its continued support of the nation Israel, and that nation's policies.

By the time the embargo ended in March 1974, Missourians had experienced skyrocketing fuel prices and exasperating shortages of gasoline. The state then formed the Fuel Allocation Program, which eventually became DNR's Division of Energy, to ration the state's fuel supply. Individuals and representatives of business, agriculture and industry quickly lined up to request fuel for their homes, factories or farms.



This 1976 photo, taken in Kansas City, illustrates the effects of industrial emissions on air quality.

By 1977, when President Carter would call energy conservation the "moral equivalent of war" and create the federal Department of Energy, the importance of energy and the hazards of an over-reliance on foreign oil had become obvious. However, with the oil crisis fading, the importance of using energy wisely to prevent pollution began to overshadow energy supply concerns.

The two largest sources of remaining air pollution are energy-related – the coal-fired power plants that provide our electricity, and the fossil fuels we gobble up in our vehicles. As an engine burns one tank of gasoline, it emits about 300 pounds of carbon dioxide, hydrocarbons, nitrous oxides and suspended particulates.

Energy production and use is the largest source of greenhouse gases, which most scientists believe contribute to global climate change. Each year, Missourians use an average of 119 million barrels of oil, 26 million short tons of coal and 253 billion cubic feet of natural gas to make 1,511 trillion Btus of energy. This results in carbon dioxide emissions of 103 million tons. Over the past 20 years, the Division of Energy has worked to stem air pollution by promoting the use of alternative fuels and environmentally friendly technologies. The division has underwritten demonstration projects and supports the federal Clean Cities programs in St. Louis and Kansas City, which help to curb air pollution through greater utilization of ethanol, compressed natural gas and soy-diesel blends.

The division also has promoted the use of wood-burning stoves that burn sawdust pellets. These create less smoke and fewer chimney fires. We helped Northwest Missouri State University use wastepaper pellets and wood chips as an energy source. This provides 90 percent of the energy needed to heat and cool the campus. We also helped Pattonville High School in Maryland Heights heat and cool its building by using byproduct gases from a nearby landfill.

Energy efficiency improves air quality by reducing harmful emissions. The division has provided nearly \$19 million in low-interest loans to schools and local governments for energy-efficiency projects. We continue to spread the message of the benefits of energy-efficient choices in homes, businesses, industries and transportation. Today, the energy-environment connection is clearer than ever as St. Louis and Kansas City cope with health threats from smog and ground-level ozone. However, while alternative technologies exist that are cleaner for the environment and able to be produced locally, Missouri still relies heavily on imported oil. Slowly but surely, Missourians are starting to be more energy self-sufficient while still saving money, protecting the environment and maintaining a comfortable lifestyle. They are investing in new energy-efficient technologies that mean less stress on the environment and less reliance on imported oil. As this trend continues, we can close the book forever on the sobering oil crises of the 1970s.

Air Quality is Looking Up

by Kenny Seeney

Environmental Improvement and Energy Resources Authority

"... Missourians care about their environment. The decrease or complete elimination of furnace smoke, dust, fly ash, polluted discharges ... is evidence of the concern and interest of public officials and citizens ..."

That simple and direct introductory statement appeared in the 1976 annual report of the Environmental Improvement Authority (EIA). The Missouri General Assembly passed House Bill 1041 in 1972 which established the EIA "to prevent pollution of the land, air, water."

There was skepticism about the bill and why government should establish an agency to provide financial assistance, particularly for industry. "At the time, it seemed like a good idea to form a government agency to help business and industry control pollution," said Robert Branom, a former St. Louis legislator who initially filed HB1041.

In 1982, new legislation added Energy Resources to the agency's name and directed the now so-called EIERA to identify energy resources, and transferred the Authority from the Bureau of Consumer Affairs, Regulation and Licensing to the Department of Natural Resources. In the 1970s and early 80s, Authority-financed projects helped establish environmental protection efforts for some of the United States' largest companies, based here in Missouri.

"In many of these early financings, air pollution control equipment was purchased through the issuance of tax-exempt bonds, which was an attractive, lower-cost form of financing," said Avis Parman, current EIERA board chairman.

Marvin Young is a senior partner in the St. Louis law firm of Gallup, Johnson, & Neuman LC, where he focuses on corporate and business law with emphasis on energy issues. A former vice president of the Peabody Coal Company, Young served as vice chairman of the EIERA during the mid-80s.

"I know Missouri industry has good intentions with regard to environmental regulations and pollution control equipment," Young said. "But they may not have addressed air quality issues in such a proactive manner, had it not been for the low-cost financing offered by the EIERA." For example: according to an EIA annual report published in the 1970s, from Dec. 15, 1973 to Aug. 31, 1976, tax-exempt bonds were issued to eight Missouri companies totaling more than \$82 million. Some other Missouri companies seeking to take advantage of the Authority's low-cost financings were Associated Electric Cooperative (Springfield), and American Cyanamid Company (Hannibal).

In a letter, dated April 1975, an associate with a Kansas City firm that produced the Authority's annual report, described several photographs to Marylene Kelly (former EIA executive secretary). The photographs relate to an Associated Electric project that would appear in the next annual report. "(here are) ... two black-and-white aerial views of the New Madrid power plant showing sites of future electrostatic precipitators and sulfur removal scrubbers."

In a later EIERA annual report, the New Madrid power plant operated by Associated Electric, is described in a photograph. "... to the left of the stack is an electrostatic precipitator which will remove 99 percent of the fly ash from stack gases."

Bill Clark has been president of the Kansas City Urban League since 1977. He served as chairman of the EIERA from 1987 to 1991 and is a former member of the Missouri Air Conservation Commission. Clark said that industry was mandated by state and federal laws to comply with clean air regulations. But compliance was not the only reason – there were long-range incentives, too.

"I think the EIERA financings for pollution control equipment in the 1970s and early 80s helped industry realize that they could have a significant impact on air quality," Clark pointed out. "To be valued as a corporate citizen,

companies need to support a clean and safe environment for employees, families, and all the people of the state."

Brad Willett agrees. Willett is manager of environmental services at American Cyanamid in Hannibal.

"Throughout the life of our facility we have worked to implement projects that have allowed our facility to grow while providing sound environmental management programs," Willett said. "Our employees are dedicated to providing a safe place to work for themselves as well as for their families who live in the communities around us."

Chairman Parman said one of the EIERA goals is to help Missouri companies protect and manage the environment. "With growing concerns about global warming and related issues, air quality is probably more important today than it was 25 years ago," Parman said. "If an opportunity arises to assist in the purchase of air pollution control equipment for a company, that is our job."

Don't miss the summer issue of Missouri Resources; we will take a retrospective look at Missouri's land resources as addressed by our divisions of Geology and Land Survey, State Parks, Environmental Quality and Energy.

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Boil Orders! Turning Up the Heat on Unsafe Drinking Water

*by Patty Ritchie
photographs by Nick Decker*

After a hard day's work, you try to relax and listen to the radio on the way home. Hmm, something about a subdivision and a boil water order, but you don't quite catch it all over the din from the kids in the back seat. As you walk up the steps of your residence, you spy a notice hung on your doorknob, demanding attention. Just when you are about to toss it in the recycling bin with the junk mail, you notice it boldly declares, "BOIL ALL DRINKING WATER."

Why would your water utility warn you to boil your drinking water? Boil water orders and advisories are issued only when microbiological contamination is the concern, which boiling the water will remedy. Boil water orders are issued when a threat to the public health exists. Precautionary boil water advisories are issued when there is concern that a problem may exist, but has not yet been confirmed. For chemical contamination, boiling may only concentrate the contaminant or expose you to more through inhalation.

There are a number of reasons you may be advised to boil your drinking water. One reason is a confirmed presence of bacteria such as *E. coli*, indicating microbes may be present that can cause disease. Low water pressure that can allow microorganisms to enter water lines and low levels of chlorine that can allow them to persist in the water pipes is another. High turbidity levels (a measure of suspended particles), and the detection of other water-borne pathogens such as *Giardia* or *Cryptosporidium* are potential causes for boil orders that occur at a much lower incidence.

It is the responsibility of the water system to notify its customers. Notification varies, depending on whether the system is classified as community or non-community. Community water systems pipe water directly to residences; these typically alert their customers by notifying area media, directly distributing notices and posting in logical places. Non-community systems serve consumers in a non-residential setting, such as a restaurant, hotel or business that has its own



Issued when a threat to public health exists, door hangers can be an effective way to notify citizens of boil water orders. It is the responsibility of local water utilities to alert customers when supplies may have become microbiologically contaminated.

well on site and dispenses this water to customers or employees; this type of public water system is required to post the notice for acute maximum contaminant level violations.

The Missouri Department of Natural Resources (DNR) frequently notifies area media of boil water orders at community systems and provides all public water systems with the needed information to distribute and post. Boil water orders are lifted when sampling indicates the contaminant is no longer present. This is, typically, when two consecutive days of samples test negative for total coliform bacteria.

BOIL ORDER PROCEDURES

Your public water system is under a boil water order.
You should observe the following precautions:

1. Boil water vigorously for three minutes prior to use. Use boiled water for drinking, diluting fruit juices, and food preparation.
2. Dispose of ice cubes and do not use ice from a household automatic icemaker. Remake ice cubes with water that has been boiled.
3. Disinfect dishes and other food contact surfaces by washing for at least one minute in clean EAO water that contains one teaspoon of unscented household bleach per gallon.
4. Water used for bathing does not generally need to be boiled. Supervision of children is necessary while bathing. For backyard pools so water is not ingested. Persons with severe rashes may wish to consult their physicians.

When under a boil water order or advisory order, there are three basic steps consumers should follow (see graphic). First, bring the water to a full, complete boil and then keep it there for three minutes. Use only water that has been boiled for the following: drinking, diluting fruit juices, all other food preparation and brushing teeth. Boiled water may be more palatable after it has been chilled in the refrigerator. Second, dispose of all ice cubes and do not use ice from a household automatic ice maker. Remake ice cubes with water that has been boiled after cleaning ice trays as described in the following step. Third, disinfect dishes and other food contact surfaces by

immersion for at least one minute in clean EAO water that contains one teaspoon of unscented household bleach per gallon of water; this is generally preferable to boiling more water. If you use a private well, the same procedure applies if *E. coli* or fecal coliform bacteria are found.

Bath water does not generally need to be boiled. Supervision of children is necessary while bathing or using backyard pools so water is not ingested. Persons with cuts or severe rashes may wish to consult their physicians. If you use an automatic dishwasher, check to determine if the drying cycle stays hot enough long enough to kill microorganisms. Buying bottled water may be a feasible alternative to boiling. Bottled water operations are routinely inspected by state health agencies.

At your residence, you have noticed that the water does not look or smell any different than usual. Boiling all your drinking water was not exactly on the schedule for the week – so is it really worth the effort? Water-borne pathogens may be present in water that looks, smells and tastes fine. Alternatively, water may be noticeably discolored due to the presence of iron or manganese without posing any kind of health threat. Disease symptoms of water-borne illness may include diarrhea, cramps, nausea and possible jaundice and associated headaches and fatigue. Of course, these symptoms may be caused by other factors as well.

The effects of water-borne disease can be most serious. In 1993, at a small town in southeast Missouri, a water-borne disease outbreak occurred. The Centers for Disease Control (CDC) reported 625 people became ill due to *Salmonella* contamination of a water tower. The CDC also concluded this contamination event contributed to the deaths of as many as seven people. Once the problem was found, this public water system immediately remedied the problem; since that time no deaths have been attributed to any public water system in Missouri. All of those who died were nursing home residents and water-borne disease is most devastating to persons who already have serious illnesses or are in a particularly sensitive age group.

To educate the public on this issue, the U. S. Environmental Protection Agency (EPA) will require all community water systems to provide their customers with their first Consumer Confidence Report by Oct. 19, 1999 covering calendar year 1998. Each report must include the following warning: "Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA and CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline at 1-800-426-4791."

The good news is that in most instances, there are no reports of illness when a water system is under a boil water order or advisory. This holds true even if laboratory tests confirmed the presence of *E. coli* or fecal coliform bacteria. A possible reason for this is that microorganisms are not usually present in large enough numbers to cause infection in most

Boil Orders Issued by Month 1996-1998

Acute maximum contaminant level violations for fecal coliform or E. coli Bacteria



To determine how well consumers took appropriate precautions, a survey was conducted following a serious boil water order. It showed that after customers were notified to boil their drinking water, 32 percent reported that someone had consumed unboiled water. Reasons given included forgetting, not believing there was a problem and not understanding that the order included ice and water used in drinks.

Most consumers are cautious, like Argyle-area resident Angie Hayes. Her water system, Osage County Public Water Supply District No. 4, experienced two boil water orders in the summer of 1998. "I have two children, ages one and four," said Hayes. "It was a huge concern my children could become ill from drinking unboiled EAO water. It was a huge inconvenience to boil all that water and use the chlorine bleach, but the choice was clear."

The cause of the bacteriological contamination was hard to find and was ultimately determined to be a hole in the well casing. This is not a typical cause of boil water orders. DNR's Geological Survey and Resource Assessment Division provided the special camera that found the problem.

You will boil your water to get rid of any microbes, no problem, but how did the contaminant get there in the first place? Inquiring minds want to know these things.



The Missouri departments of Natural Resources and Health team up to test public water systems for microbiological contaminants. Patrick Shannon of the Department of Health prepares an apparatus for testing another round of public drinking water samples.

Water towers and other water storage facilities are particularly vulnerable to microbial contamination from birds. An article entitled "Public Drinking Water's Aging Infrastructure" in the Winter 1997-98 issue of Missouri Resources details this problem. Contaminated water towers, stand pipes and other tanks still are being found. Water systems must be vigilant and inspect all their water storage tanks on a regular basis.

Even floods can cause far-reaching effects, such as direct wellhead contamination, water main breaks, increased turbidity, and loss of electrical power to pumps and other crucial equipment. Even inundation of entire water treatment plants can result from stubborn floodwaters.

More boil orders are issued during the summer months. One explanation for this is that bacteria like warmer weather. In 1998, many apparently decided to hang around after the mild winter from December 1997 to March 1998. DNR's monitoring effort is paying off by finding these public water systems with major bacteriological problems. The graph also puts the problem into perspective. The greatest number of boil orders issued for this type of violation was 19 in August 1998. This represents less than 1 percent of the 2,700 public water systems in Missouri. So, while acute violations at public water systems can be serious, they are rare.

The number of boil orders also varies by the type of system producing and dispensing the water to the public. Rural water districts, for example, have an excellent record in this area and in 1997 there were no acute violations at this type of system. Transient non-community water systems, so named because they do not typically serve the same people on a daily basis, did not fare so well. This group, which includes restaurants, resorts and campgrounds with their own wells, accounted for 38 percent of the public water systems in the state. However, that same group also had 57 percent of the acute violations for fecal coliform or E. coli bacteria in 1997.

The phrase "know before you go" can apply to domestic as well as foreign travel. Try to determine ahead of time if the drinking water at your destination has been tested adequately and meets all drinking water standards, particularly if you or a loved one may be more vulnerable to any contaminants.

Of additional concern, transient non-community systems accounted for 65 percent of the major monitoring violations for total coliform bacteria in 1997. DNR's Division of Environmental Quality Director John Young expressed his commitment to correct the problem. "It is of vital importance that systems routinely test their drinking water to ensure the safety of those who consume it," said Young. "When monitoring violations are found at water systems that have also had acute violations, we're very concerned about the unknown quality of the drinking water when samples were not submitted. DNR will pursue all options to guarantee safe drinking water for each citizen and visitor of Missouri.

"A relatively few problem systems account for a lot of the violations, as the vast majority of both community and non-community systems conscientiously comply with all monitoring requirements and drinking water standards," Young added.

If you would like more information about public water systems, contact DNR's Public Drinking Water Program at 1-800-361-4827 or (573) 751-5331. If your drinking water comes from a private well, you can contact the Missouri Department of Health at 1-800-392-7245. The Annual Compliance Report of Missouri Public Drinking Water Systems is available free from DNR for 1996 and 1997. The annual report for 1998 will be available July 1, 1999. If you would like a copy, call 1-800-361-4827.

Patty Ritchie is an environmental specialist with the Public Drinking Water Program within DNR's Division of Environmental Quality.

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Driving for Clean Air in St. Louis

*by Kerry Cordray
photographs by Nick Decker*

Morning arrived, another typical summer workday morning in the St. Louis metropolitan area.

Jumping out of bed and moving quickly through his morning routine, Commuter Chris hustled to the car, jammed the key into the ignition, revved the engine and started his daily trek to the office through the half-light of the new day. Traffic reports on the radio sounded worse than usual today, including a reported accident on his usual route. The job was a good 30 minutes away on a day with normal traffic congestion, so he decided to try an alternate route to avoid the promised tie-up. But moments after entering the freeway and topping the first hill, he saw a long string of glowing red taillights ahead and knew it was going to be one of those days.

Gazing down the line of vehicles stretching out of sight around a bend, he smiled, glad he wasn't trapped behind either of the cars ahead that were filling the air with blue smoke. His mind wandering, Chris noticed the tailpipe of the station wagon in front of him steadily puffing out a small stream of hot gas barely visible to the eye. The vehicle was like a small factory complete with its own tiny smokestack, busily filling the air between the two vehicles with a light blue haze. Minivans, trucks and sedans hemmed him in, each with its own "smokestack" relentlessly pouring out its payload of waste. Commuter Chris realized although each of these vehicles had an important occupant or commodity to deliver, they all delivered something else, too. Each was releasing the byproducts of burning petroleum into the atmosphere.



Trouble Starts "Where The Rubber Meets The Road"

We have all heard this expression from time to time. Figuratively, it means "here is where forces come together to make something happen."

In St. Louis, a major air pollution problem quite literally comes from where rubber meets the road – on interstates, streets and highways clogged with vehicles. In the 1990s, more cars and longer commuting distances for many workers have meant that motorists are driving thousands more miles than they drove just a few years ago.

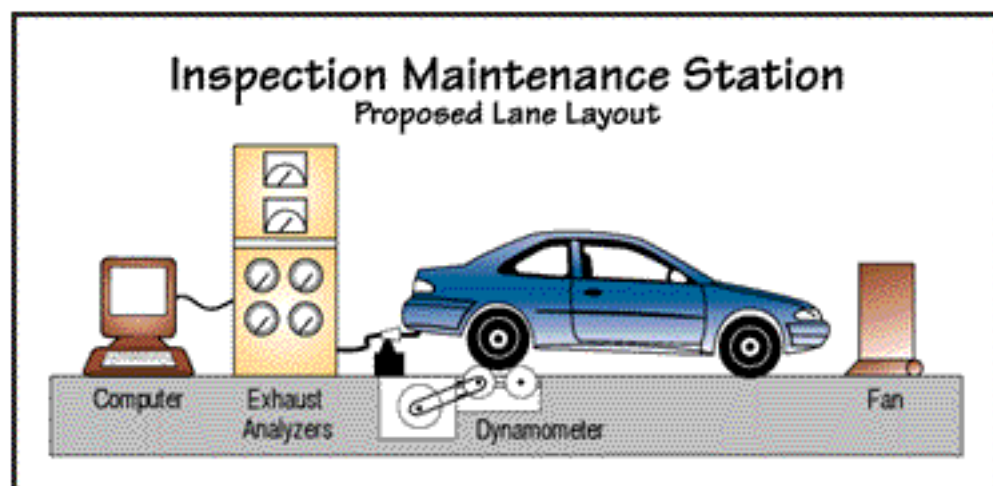
"Like most cities in the United States, the trend in St. Louis is for more vehicles driving more miles every day," said Mike Coulson, environmental manager at the East-West Gateway Coordinating Council. "In 1990, residents on the Missouri side of the metro region drove 42.7 million miles per day. By 1996, that mileage total had risen to 50.3 million, and by 2005 it will rise to an estimated 57 million miles every day."

More vehicle miles being driven mean more gallons of fuel used. And every gallon of fuel burned by a vehicle engine releases pollutants into the air of the St. Louis metro area. These pollutants, when mixed with the right amount of heat and sunlight help create ground-level ozone, or "urban smog."

St. Louis Ozone Nonattainment Area



Map of St. Louis Ozone Nonattainment Area



St. Louis has an ozone problem, and we know that one of the keys to an eventual solution to the problem lies with the individual car owner. The advances in car technology in the last 20 years have brought the need for newer and more effective ways to test a vehicle's emission system. In 1994, the Missouri Legislature passed a law to improve the emissions testing program. The Missouri Department of Natural Resources (DNR) further developed the plan by meeting with

citizens, legislators, city and local governments and businesses of the St. Louis area. The planned Enhanced Inspection/Maintenance Program accounts for 43 percent of the pollution reductions needed to help the area achieve healthy air quality. St. Louis is about to join the ranks of the many U.S. metro areas where advanced emission-testing technology is used.

Air Pollution 101 - Ozone

To understand the need for better vehicle emissions tests, it is necessary to know a little about air pollution, the problems it causes and what efforts have been made to control pollution at its sources.

There are many kinds of waste gases released by automobiles, factories, open burning and the evaporation of gasoline and chemicals. Some of the most common of these pollutants include volatile organic compounds (VOCs). Evaporating gasoline and other petroleum-based products are full of these compounds. Poorly tuned vehicles that burn fuel inefficiently are a major source of urban VOC pollution.

Another common group of air pollutants is nitrogen oxides (NO_x). Almost anything that burns produces some NO_x. The largest sources of NO_x are coal-fired power plants that generate electricity. Motor vehicles also are a major source of NO_x.

VOCs and NO_x by themselves are not pleasant or healthy to breathe, but when they come together under the right weather conditions, they create something even worse. On warm sunny days in St. Louis and in many other U.S. cities, sunlight cooks these air pollutants emitted from automobiles and other sources until a chemical reaction takes place. The result of this is the formation of ground-level ozone.

On several days every summer, the amount of ground-level ozone in St. Louis reaches dangerously unhealthy levels. Just being outside on such a day can be very dangerous for children, the elderly and those with asthma or other respiratory diseases.

"A 1997 study of children with asthma showed that air pollution episodes significantly and consistently correlated with asthma symptoms and deficits in lung function," said Susan Glassman, executive director of the American Lung Association of Eastern Missouri.

Days with unhealthy air quality have been documented in numerous health studies to cause serious health effects, bringing increases in hospital admissions and emergency room visits and more employee sick days. "On a bad air day, we can usually plan for a 7 percent increase in office visits from patients with asthma," said Dr. Courtney Crim of the St. Louis University Hospital Department of Pulmonology.

The Battle For Better Air Quality Is Decades Old

The City of St. Louis has been fighting air pollution since the 1930s. The Clean Air Act of 1964 established national health-based standards for air pollutants and required states to monitor the air to determine if areas met the standards. DNR collects data from 11 ozone monitors in the St. Louis metro area, while five monitors on the east side of the metro area are operated by the Illinois Environmental Protection Agency (IEPA).

The U.S. Environmental Protection Agency (EPA) designates an area that violates the standards as a nonattainment area. A violation of the standard occurs when an air quality monitor exceeds the National Ambient Air Quality Standard for a pollutant more than three times in a three-year period. The St. Louis ozone nonattainment area includes the city of St. Louis, four counties in Missouri and three counties in western Illinois.

St. Louis has made progress in its fight to control ground-level ozone. First, a simple vehicle emission-testing program was initiated in 1984. Devices to recover gas vapors at filling station pumps were installed in 1988 and 1989. New car technology brought cleaner running engines, and industrial controls have been broadened and upgraded. These control measures brought fewer days with dangerously high ozone levels but not enough improvement to bring the area into attainment of the health standard.

In 1990, Congress passed significant changes to federal clean air laws. States were required to develop State

Implementation Plans to further reduce emissions. The plan for St. Louis will accomplish the reduction goal with a combination of industrial controls, gasoline controls and the enhanced vehicle emission inspection and maintenance program. "The city and state have been working on the ozone problem for almost 30 years. A better vehicle emission test is key to achieving clean air," said Roger Randolph, director of DNR's Air Pollution Control Program.

Vehicle Emission Testing

Vehicle emission tests have been conducted in the city of St. Louis and the counties of St. Louis, St. Charles and Jefferson since 1984. It is a decentralized testing program, meaning any person can purchase the necessary equipment, be certified by the Missouri State Highway Patrol and conduct emissions inspections. "The test equipment back then was known as BAR80, as the California Bureau of Automotive Repair approved it for use in 1980. Cars were tested at idle and checked for levels of hydrocarbons in their exhaust," said Chuck Dachroeden of DNR's St. Louis vehicle inspection quality assurance facility. "This was an appropriate test for vehicles with carburetors – cars and light duty trucks of the 60s, 70s and early 80s."

Advances in analyzer capability, the need to assure analyzer calibration and testing accuracy and the need to collect emission test data required a change in the type of test equipment. In 1990, tests were upgraded to require the use of the BAR90 emissions analyzer, which also tests exhaust while cars idle. About 900 facilities, including service stations, car dealerships, repair shops and some fleet operations now conduct BAR90 inspections in the St. Louis area. Pre-1971 vehicles, heavy-duty vehicles, diesels, motorcycles and alternate-fuel vehicles are exempted from emission testing.

Better Testing Required

Unfortunately, the emission testing technology St. Louis has employed since 1984 hasn't kept pace with the technology of the cars being tested. Since the mid-80s, the great majority of new cars have computer-controlled fuel injection engines. "Since fuel injection was introduced, electronics on new cars measure and sense an increasing number of conditions. The electronics then control engine efficiency, including a calculated and exact amount of fuel through the injectors," said Brian Johnson, automotive maintenance instructor at Ranken Technical College in St. Louis.

Before these developments in automotive technology, a test conducted while the engine was idling gave a good picture of how well the car performed. With the computer-controlled fuel systems of new cars, a more comprehensive and rigorous test will give a more accurate and reliable picture.

"A car needs to 'go through the paces' – to idle, accelerate, cruise and decelerate for the 'whole picture,' so we can have a more realistic idea of the pollutants it emits under everyday driving conditions," the instructor added.

The federal government tests the fuel economy and emissions of new model year and prototype vehicles using a three-day battery of tests called the Federal Test Procedure. A more practical test method that emulates the Federal Test Procedure is the IM240 test procedure. The IM240 test gets its name from its role in inspection and maintenance with a test length of 240 seconds. The test uses a treadmill-like device called a dynamometer or "dyno" to allow the vehicle to be idled, accelerated, cruised and decelerated in a simulated short road trip. The total amount of pollutants are collected and measured in grams-per-mile-traveled. This is a much more accurate measurement of actual pollution than the current BAR90 test that analyzes pollutants as a percentage of the exhaust stream.

The new test procedure is being successfully used in several metropolitan areas across the country, resulting in strong air quality benefits for citizens. "In Phoenix, the program tests about one million cars per year since 1995, and we're reducing overall emissions by over 300 tons per day," said Dan Grubbe, Arizona's Inspection/Maintenance program manager. "We receive regular compliments from customers on program efficiency, convenience and quality of service."

The Illinois EPA began using the IM240 test in Chicago and on the east side of the St. Louis metro area starting in early 1999.

"We'll have seven test stations operating in the St. Louis metro east area," said Elizabeth Tracy, manager of vehicle Inspection/Maintenance for the Illinois EPA. "The new test is twice as effective as the basic tailpipe test."

How The New Inspection/ Maintenance System Will Work

The biggest change for St. Louis-area motorists to adjust to will be taking their car for an emissions test every two years at test stations set up especially for the new emissions tests.

"They'll still go to their local garage for their annual safety inspection," said Karl Fett, I/M unit chief for the department's Air Pollution Control Program. "But emission testing will only be done every other year, based on the model year of the vehicle. Even-year vehicles will be tested in even-numbered years; odd-year vehicles will be tested on odd-numbered years."

Only 1981-and-newer vehicles will be subject to the new IM240 test. Vehicles from model years 1971 to 1980 will be tested using an idle test similar to the one used now. Vehicles older than 1971, motorcycles and trucks with a manufacturers rating of 8,500 pounds in gross weight or more will be exempt from testing.

The new test program also will incorporate the use of a developing technology called "remote sensing" to screen vehicles before testing. On-road devices will measure pollutants as cars pass. If a vehicle shows relatively low levels of pollution, it may be exempted from the station-based emissions test. St. Louis will be the first city in the United States to employ this kind of "clean screening" for the convenience of the motorist.

The Road To Better Vehicle Emissions Testing

The Missouri General Assembly passed legislation authorizing DNR to implement an Enhanced Inspection/Maintenance Program in the St. Louis area in 1994. However, the start of the new program has been stalled several times since the enabling legislation was passed, because of concerns about motorist convenience. With the addition of "remote sensing" and under direction of the legislature, DNR issued a Request for Proposals for



Chuck Dachroeden of DNR connects an emissions analyzer to an automobile's engine at a test facility in Olivette. Vehicle emissions tests have been conducted in the St. Louis area for 15 years.

the new test stations in October 1998.

"Healthier air in St. Louis is our goal, but customer convenience has been one of the top priorities for planning this program," said DNR Director Steve Mahfood. "We believe using remote sensing to screen vehicles added to the improved test procedure will make the St. Louis program one of the most effective and convenient in the country."

In February 1999, a contract was signed with Environmental Systems Products Inc. (ESP) to build and operate the new test stations. The contract calls for the stations to open in the spring of 2000. "We look forward to providing St. Louis with the most advanced vehicle emissions testing program available," said Terry McKenna, chief executive officer of ESP.

Cleaner Air = Better Health

Finding and fixing the worst polluters among the more than 1.2 million tiny vehicle smokestacks in the St. Louis area is a big project. "It has taken years of hard preparation, and it still will require the care and cooperation of citizens, employers, auto technicians and every

vehicle owner in the St. Louis area to make it work smoothly," said John Young, director of DNR's Division of Environmental Quality. "The result will be well worth the effort. Every person in the St. Louis metro area deserves to breathe clean air, and every motorist can have the satisfaction of making it possible."

Kerry Cordray is an information specialist with the Air Pollution Program in DNR's Division of Environmental Quality.



Bob Weil of St. Louis Community College instructs students in the proper use of equipment used to analyze a car's emissions. In the St. Louis area, more than 900 facilities conduct vehicle emissions tests.

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Spring (Green) Cleaning

For many of us, now is the time to sweep away winter once and for all by cleaning our homes from top to bottom. The following homemade items can be used as cleaning substitutes for commercial products. By comparison, many of the commercial items are costlier and not as environmentally safe.

- All-purpose cleaner: A cleaner can be made by mixing one-half cup of ammonia, one-quarter cup of vinegar and a handful of baking soda into a gallon of warm water. Do not use this mixture on wood.
- Glass cleaner: Mix equal amounts of water and vinegar in a spray bottle for use as a glass cleaner. Chemical cleaners can leave a residue that will cause streaking when used with this solution so first wipe windows with rubbing alcohol.
- Furniture polish: A natural polish can be made by combining two teaspoons of lemon oil with a pint of mineral oil in a spray bottle.
- Drain cleaner: To loosen blockage, combine one cup each of baking soda, salt and white vinegar. Pour this mixture down the clogged drain and wait 15 minutes. Flush the drain thoroughly with boiling water.
- Floor polish: Polish linoleum and vinyl floors with one part thick, boiled starch and one part soap suds. Rub on the floor, then polish with a cloth that is soft and dry.

Source: U.S. Environmental Protection Agency

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LETTERS

Our recycled birdhouses ("Reusables," Missouri Resources, Winter 1998-99) were popular, generating more than 600 requests for the plans. Here is a small sampling of the letters. It looks like house hunting in Missouri will be a little easier for the eastern bluebird in 1999.



Would you please send me three copies of instructions for birdhouses made from reusables? As Conservation Chairman for our Federated Club, I would like to promote the building of bluebird houses. One would be for my file, and one each for Boy Scouts and Girl Scouts.

Carlotta Arnold
Jamesport

Please send me the design plans for the bluebird house. Our garden club is starting a bluebird trail and will be building ten houses. Thank you. We all love *Missouri Resources* magazine.

Mitzi Chase
Gravois Mills

Here at Memory Lane Farms, we create and maintain bird and animal sanctuaries. We would appreciate any information or plans that may help us in our endeavor, such as the bluebird house you show on page 19 of your Volume 15, Number 4. We are interested in all animals and birds, such as bluebirds, purple martins, etc. Thanks.

Ed Brand
Memory Lane Farms
Festus

Please send me the instructions for the bluebird house. We enjoy the magazine very much and always pass it on to someone else. Thanks.

Andrew Pruitt
Springfield

I would like to receive a copy of your instructions on how to make birdhouses from recyclable materials. I am an art and math teacher at Gorin R-III and would like to use your resources on building these birdhouses and any other useful information you would have may be useful doing the integration of this project.

Thank you for your time and resources!

Karen Yancy
Luray

Please send a step-by-step written set of instructions for the bluebird house to me. I plan to utilize these as a summer school project. Thank You.

Carolyn Beal
Iberia

Please send step-by-step written instructions with diagrams for the bluebird birdhouse. The plans will be used at a YMCA preschool and daycare.

Minnie Souttee
Kansas City

Would you send me the plan for the birdhouse using recycled materials as offered in *Missouri Resources* magazine? You have a wonderful magazine which I look forward to receiving every time it is published. You're doing a good job!

Jack Thomas
Belle

Letters intended for publication should be addressed to "Letters," *Missouri Resources*, P.O. Box 176, Jefferson City, MO 65102-0176 or faxed to (573) 751-7749, attention: "Letters." Please include your name, address and a daytime telephone number. Space may require us to edit your letter. You can e-mail *Missouri Resources* staff at moresdnr@mail.dnr.state.mo.us

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NEWS BRIEFS

Phosphorous limits set at lake

As a result of concerns expressed by southwest Missourians, DNR formed an advisory committee to discuss phosphorous limitations on wastewater treatment facilities that discharge into the Table Rock Lake watershed. The committee, which has been meeting since October 1998, recently reached a consensus. It recommended the department and the Missouri Clean Water Commission consider the following:

- Facilities that discharge 1 million gallons per day or greater shall not exceed 0.5 milligrams per liter (mg/l) of phosphorus as a monthly average.
- Facilities that discharge 100,000 gallons a day but less than 1 million shall not exceed 1.0 mg/l of phosphorus as an average per month.
- Existing wastewater treatment facilities within Table Rock Lake Watershed Basin shall not exceed 0.5 mg/l of phosphorous as an average per month.
- All newly permitted treatment facilities within the Table Rock Lake Watershed Basin constructed after the rule date shall include phosphorous treatment and discharges not to exceed 0.5 mg/l of phosphorous as a monthly average.

About 115 people attended an August 1998 meeting hosted by the department on water quality in Table Rock Lake. The half-day meeting in Branson drew city, county and state officials, wastewater treatment operators and citizens to listen and discuss water quality trends on the lake. The primary focus was the impact of nutrients, in particular phosphorus, that are entering the James River and Table Rock Lake.

The department's goal is to have the regulation in place by late 1999. For more information, contact DNR's Southwest Regional Office at (417) 891-4300 or the Water Pollution Control Program at 1-800-361-4827 or (573) 751-1300.

Sunny technology to shine in K.C.

Soltech 99, a national conference showcasing innovative solar technologies, will be held April 17 to 21 in Kansas City.

Sponsored by the Solar Energy Industries Association, the Division of Energy and other organizations, Soltech will highlight solar applications in agriculture, transportation, computing, telecommunications and other professions.

"It's an honor for Missouri to host this event," said Anita Randolph, director of the Division of Energy. "Companies are realizing that solar technologies are useful in the Midwest."

Rising demand for energy loans

In the last six months, a surge in requests for funds from the Division of Energy's Energy Efficiency Revolving Loan Fund has established a record for the most dollars ever loaned by the fund in a year.

The loans assist Missouri public schools and local governments with projects that reduce utility bills, improve comfort and reduce environmental impacts through more efficient use of energy resources. In the first six months of this fiscal year, the loan fund has awarded more than \$5.7 million, up from \$1.8 million and \$926,000 when compared to the two previous years. This year's awards will save schools and local governments \$785,000 annually in energy costs.

Times Beach wins national award for beautification

Keep America Beautiful, Inc. has recognized the transformation of the former community of Times Beach from a Superfund site to a state park. The program presented its 1998 national award in the category of beautification for businesses to Agribusiness Technologies, Inc. because of the cleanup of the St. Louis County site.

Times Beach became a Superfund site in the early 1980s when dioxin contamination was discovered in the community. The cleanup of the site was accomplished in a cooperative effort with Agribusiness Technologies, DNR and the U.S. Environmental Protection Agency. Once the cleanup was completed, the site was turned over to the Division of State Parks and plans are under way to make it a state park.

The park will be named Route 66 State Park because a portion of this historic route runs through the 409-acre park. When completed, the park will include hiking, bicycle and equestrian trails, picnic areas, a special event area, access to the Meramec River, and a visitor center. Initial facilities should open later this year.

Parks employees honored by MPA

The Missouri Parks Association (MPA) has recognized four employees of the department's Division of State Parks with State Park Employee of the Year Awards.

The MPA is a nonprofit volunteer association created to support Missouri state parks and historic sites. The group chose the four from employees who had been nominated and selected by their peers for the division's Masterpiece Awards, which are given out quarterly for outstanding service. The State Park Employee of the Year Awards were presented in four categories: maintenance and construction; field; facility head; and central office.

Employees receiving the awards:

- Randy Quade, park maintenance worker at Bollinger Mill State Historic Site near Burfordville, received the award for the maintenance and construction category. Quade was selected for his outstanding site maintenancework.
- Ron Mullikin, naturalist at St. Francois State Park near Bonne Terre, received the award for the field category. Mullikin was selected for his work in natural resource stewardship at St. Francois State Park and surrounding parks as well as his outstanding interpretive skills and abilities.
- Dan Files, superintendent at Pershing State Park near Laclede, received the award for the facility head category. Files was selected for his sensitive and professional handling of a difficult situation while maintaining his other responsibilities.
- Sue Holst, the division's information officer in Jefferson City, received the award for the central office

category. Holst was selected by MPA for her professional handling of sensitive media issues and her coordination of positive messages about the division.

The awards were presented during MPA's annual meeting at Roaring River State Park in September 1998.

GSRAD initiates well log program

The DNR Geological Survey and Resource Assessment Division has initiated a log-for-fee program to process residue logs for wells.

A residue log is a graphical description of the geology and subsurface water-flow characteristics at a well site based on rock samples retrieved from the well while it was being drilled. After the residue samples are received, they are processed by a lab technician and placed in individual vials for study by a geologist. The residues allow the well to be studied at five-foot intervals from top to bottom. The study will reveal which geologic formations have been penetrated and at what depth, which formations are most likely to produce the most water and zones where the potential for water quality problems may exist.

Residue logs are the most detailed and specific of any available in Missouri. All various rock types (chert, sand, silt, shale, dolomite and sandstone) are carefully illustrated. They are shown by percentage, in color, and at the depth they were found. Any potential problems are indicated. Upon completion of the log, all pump and casing information, including pump test data, pump settings, make and capacity, are indicated.

The fee of \$31 per 100 feet helps provide equipment dollars. For information on the log-for-fee program, contact Rex Bohm or Sharon Hankins at (573) 368-2190.

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ONE LAST WORD

Earth's Day to Shine

by Ken Brogdon

Literature, giveaways and prizes that focus on environmental learning and fun light up children's faces and spark their interest in DNR Earth Day activities.

Whether she was fully aware of it or not, five-year-old Megan Kelly has celebrated Earth Day every year of her life, according to her father, David. On April 22, she will continue this Kelly family tradition. Megan will join her mom and 18-month-old sister Emma, along with thousands of others on the south lawn of the Capitol in Jefferson City at Earth Day 1999.

For the Department of Natural Resources (DNR), this 29th annual observance of Earth Day is a special one because it coincides with the agency's 25th anniversary. Like many DNR employees, David Kelly said that his daughter literally has grown up with the annual Earth Day celebration occupying an important part of her young existence. As special events coordinator for the department's Division of State Parks, Kelly chaired the 1998 Earth Day planning committee.

Last year a record crowd of 4,000 people enjoyed environmental games, music and performances by a variety of entertainers, including St. Louis' popular World Bird Sanctuary. A total of 63 classes from 23 schools across Missouri attended the environmental festivities at the Capitol.

For Earth Day 1999, Kelly is in charge of school registration. He knows that it will take a focused and concentrated effort to exceed last year's record number of 1,500 students. However, it only takes a few hundred eager young scholars to transform the south lawn of the Capitol into a jubilant, carnival-like arena of environmental learning and fun.

"Sometimes it takes a ... special commemoration to remind people about things we take for granted," Kelly said. "There is no better time for an environmental wake-up call than the department's 25th anniversary year at

Earth Day 1999."

At the Kelly household near Hartsburg, this environmental wake-up call has resulted in action. "Earth Day makes me think about recycling, and making toys and fun things out of trash," Megan said.

One of the most important offerings from Earth Day is the opportunity to learn something new and meaningful that can be shared with friends, family and neighbors. "Last year's learning project was a bluebird house made from recycled materials (see "Reusables," Missouri Resources, Winter 1998-99). Our bluebird house served as a home for a total of 15 baby bluebirds. Our whole family had a great time watching the birds grow and leave the nest. Two years ago, the project was a compost bin. Three years ago we planted a wind break with pine trees." The bluebird houses were designed and constructed by Bob Hentges, director of Jefferson City's Regional Office.



Literature, giveaways and prizes that focus on environmental learning and fun light up children's faces and spark their interest in DNR Earth Day activities.

Now that Megan is five, her dad reports that she has a greater awareness of past and future Earth Days. In fact, Megan already knows how she would like to observe the golden anniversary of the department in 2024 when it corresponds with the 54th Earth Day. Megan will be 30 in April 2024 and hopes to spend the day in a park among blooming trees and chirping birds.

For 18-month-old Emma, she also has celebrated Earth Day the single year and few months of her very young life ... whether she is aware of it or not.

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Operation Brightside: Perennial Success Stories

by Nina Thompson

photographs by Operation Brightside

A 1997 editorial in the St. Louis Post-Dispatch made positive comments about the many daffodils planted along the city's highways. It mentioned how a relatively small investment in 1984 still lifts spirits in St. Louis each spring, and how future partnerships can develop more great ideas like a cleanup campaign downtown. It also called on the "Brightside kids" to come back and join with neighborhoods to find more simple ways to lift the hearts of countless St. Louisans.



Well, the news is good, "Brightside kids" and the thousands of St. Louisans who volunteer under the not-for-profit partnership Operation Brightside, never left. Current projects like Growing St. Louis and Neighbors Naturescaping are still making tracks at creating an urban greening partnership that spans the St. Louis region. The Environmental Youth Corps still provides a valuable service by eradicating a common urban eyesore – graffiti. The new "St. Louis in Action" project was organized to "clean and green" St. Louis for Pope John Paul II's visit last January. Though a grassroots effort, Brightside planted 1,000 trees along major thoroughfares and in parks in St. Louis as a living tribute to the papal visit. The planting effort will benefit St. Louis well into the new millennium.

"Operation Brightside celebrated its 15-year anniversary in 1997 and large numbers of volunteers are still turning out to help with the projects," said Mary Lou Green, Brightside's Executive Director. "Under one of our programs alone, we've had more than 75,000 volunteers. That doesn't even include all of the help we've had with our other eight projects over the years. I'd say Brightside is still very much alive and productive."

Operation Brightside began in 1982 after a survey showed that residents thought being dirty was one of the city's biggest problems. The partnership was an effort to clean up the city and help St. Louis residents make their communities better places to live and work through urban greening partnerships. Supporters include labor unions, schools, churches, and neighborhood groups. Additional support

from Anheuser-Busch, Missouri Botanical Garden, Boeing Employees Community Fund, A.G. Edwards & Sons Inc., Missouri Department of Conservation and the St. Louis Development Corp. has benefited Brightside efforts.

"On the national level there has been a recent push toward volunteerism, but we've had volunteers in St. Louis for the past 17 years, and if anyone wants to visit us we can show them how it is done," said Green. "This effort has lasted this long because people in St. Louis are willing to work hard for what they believe in, and they believe in taking care of their communities.

Cleaning up vacant lots, planting daffodils, shrubs and perennials, and helping smaller communities all have gotten a big response from volunteers. Project Blitz, one of the partnership's cleanup and beautification efforts has had more than 75,000 volunteers each year since it began in 1982. Project Greenlot, which also was started in 1982, can boast of being the tool that led to the clearing, grading and seeding of more than 13,000 overgrown lots.



Daffodils and beautiful greenery that adorn the city's highways serve as reminders that diverse partners can join together for the common good of a community.

Thanks to the daffodil planting program, Project Flower Shower, more than 12 million daffodil bulbs already have been planted along the highways. Under Growing St. Louis and Neighbors Naturescaping programs designed to help beautify communities, 146 greening projects have been planted in just three years.

One of the biggest cooperative efforts under Operation Brightside is the recycling center it operates with the City of St. Louis. "Local St. Louis companies donated all of the equipment and labor to build the center and for 10 years, we were the only multi-material recycling facility in St. Louis," said Green, adding that the center accepts millions of pounds of material each year. This includes newspaper, glass magazines, mixed office paper, cardboard, steel cans, aluminum, telephone books and plastic bottles and jugs.

No money is generated for Operation Brightside from the recycling operation. Since the center does not generate enough money to break even, the cooperative effort with the City of St. Louis includes the city paying for the operation of the center.

Daffodils planted more than 10 years ago continue to lift spirits in St. Louis, just as the Post-Dispatch article said. But it is 1999, and residents throughout the area are reaping the benefits of more than these beautiful plants. They can see cleaner, more beautiful neighborhoods where Brightside volunteers have helped them recycle trash, complete



Operation Brightside's Environmental Youth Corps removes graffiti from public and private buildings throughout St. Louis. In only seven years, these youngsters have completed 40,000 such projects.

beautification projects and clean up vacant lots.

Although Operation Brightside could always use more volunteers for its urban greening programs, the "kids" that planted the original flowers are very much still on the move. With your help, they could be in your neighborhood next.

Nina Thompson serves as the communications director for the Missouri Department of Natural Resources.

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RESOURCE HONOR ROLL

State and national honors have been awarded to the Waste Tire to Energy Team for its successful and innovative approach to cleaning up illegal tire dumps. This three-partner team is composed of the Missouri departments of Natural Resources and Corrections, and the University of Missouri-Columbia (UMC).



Waste Tire to Energy Team

The team received the Missouri Governor's Award for Quality and Productivity in July 1998 and recently was presented one of eight America's Best Innovations Awards by the Council of State Governments (CSG). Both awards praised the group for its work in encouraging the recycling of waste tires for heating fuel and providing training opportunities for prison inmates. Missouri prisoners cleaned up illegal dumps and shredded tires for use as heating fuel.

It is estimated that the team's work has led to the removal of approximately 800,000 scrap tires from illegal dumps in the state. In addition, the group's efforts allowed UMC to reduce smokestack emissions by 250 tons per year and save \$100,000 annually in heating bills. Since 1990, the department has cleaned up more than 145 illegal dumps containing 2.7 million tires.

Pictured above from left to right are DNR members of the Waste Tire to Energy Team: Jim Bell, Dan Fester, Richard Allen, Jim Hull, Cindy Kemper, John Young.

The American Association of Petroleum Geologists (AAPG) recently selected Herb Turner as the first recipient of the Excellence in the Teaching of Natural Resources in the Earth Sciences Award. Turner has taught earth science at Waynesville Middle School for 13 years. His nomination was made by the Association of Missouri Geologists, a member of AAPG.



Herb Turner

The competition is open to all earth science teachers kindergarten through grade twelve. One representative is chosen from each of the 50 states to compete at the national level. The prestigious award includes \$2,500 earmarked for use in the classroom and \$2,500 for his personal use.

Turner teaches his students about the geologic history of Missouri. Classroom discussions include the history of mineral resource exploration, development, recovery, conservation and environmental management. The students then form their own small classroom model companies and learn how a mineral resource is turned into a usable,

marketable product, and then how to restore the land to a usable condition.

Turner will receive the award in April at the National AAPG Meeting in San Antonio, Texas.

For 11 years, the St. Louis chapter of the Sierra Club has worked hard to restore the glades and savannas at Meramec State Park. Working more than 6,630 hours, the volunteers have helped clear brush and invading cedar trees to open up the glades and savannas so that vegetation native to the park can once again flourish.

At the heart of this volunteer effort is Penny Holtzmann, a medical records clerk at Veterans Hospital in St. Louis. For eight years, Holtzmann has helped organize the weekend work trips to the park. These trips are definitely not a walk in the park because they normally involve cutting brush and small trees, and dragging them to a pile to stack them for burning later. Holtzmann also collects native wildflower seeds, dries them in her garage and prepares them for spreading on the glades.

The group's efforts, led by Holtzmann, have made substantial contributions to restoring the natural landscapes at the park for the public to enjoy.

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RESOURCES TO EXPLORE

Mark Twain State Park and State Historic Site

by John Huffman and Charles Hesse

Drive through much of northeast Missouri and you will find a gently rolling landscape, small towns and numerous farms. Nestled in the midst of all this tranquillity is a bit of a surprise for the traveler who turns onto Mo. Highway 107. Suddenly there is a terrain more reminiscent of southern parts of the state: woodlands made up of oaks, hickories and maples; limestone bluffs; and an 18,000-acre lake full of bass, catfish and crappie. This is where your search will be rewarded by discovering two places that are tied to one of America's best-known authors – Samuel Langhorne Clemens, better known to the world as Mark Twain. These picturesque places are Mark Twain Birthplace State Historic Site and Mark Twain State Park, both in Monroe County.

In his autobiography, Mark Twain vividly recalled and described his first home: "My parents removed to Missouri in the early 'thirties; I do not remember just when, for I was not born then and cared nothing for such things. It was a long journey in those days, and must have been a rough and tiresome one. The home was made in the wee village of Florida, in Monroe County, and I was born there in 1835. The village contained one hundred people and I increased the population by 1 percent."

Florida, the oldest town in Monroe County, is an even smaller community today than it was in 1835, but the memory and achievements of Mark Twain have been well preserved.

The idea of preserving Samuel L. Clemens' birth cabin germinated with Albert Bigelow Paine, Mark Twain's first biographer, who wrote in 1912, " ... it should be preserved and guarded as a shrine for the American people" Merritt A. Violette, who had been born in Florida just 14 years after Samuel L. Clemens, initiated the home's preservation process in 1915.



Donated to the state in 1924, Mark Twain State Park in Monroe County overlooks the 18,600-acre Mark Twain Lake.



At Mark Twain Birthplace State Historic Site in Monroe County, a popular attraction is the two-room cabin in which Samuel Clemens was born. The structure is preserved inside a modern museum.

During the next five years, "Dad" Violette, as he was known locally, completed the restoration, furnished the cabin where Twain was born with period artifacts, opened it regularly to the public and began construction of a campground. Editors of the Northeast Missouri Press Association supported Violette's efforts by advocating a park in the memory of Mark Twain to be developed in the Florida vicinity. This support led to the establishment of the Mark Twain Memorial Park Association in 1923. Over the next two years, individuals and organizations from the surrounding area raised money for the project. Twain's sole surviving daughter, Mrs. Clara Clemens Gabrilowitsch, gave singing concerts to benefit the memorial effort.

Donated to the state in 1924, Mark Twain State Park is the third oldest in the state and the oldest north of the Missouri River. Always a popular destination for campers and fishermen, the 2,775-acre park gained even greater desirability as a fun place to visit with the completion of Mark Twain Lake in 1982. Now, it serves as a prime location for access to a wide variety of lake activities. Many visitors launch pleasure craft and sailboats here and head to the western portions of the main body of the lake. Fishermen launch here and head west to access the upper arms of the lake with all of their standing timber. In fact, the boat ramp located just off of Highway 107 sees the launching of more bass tournaments than any other ramp on the lake.

Not everyone comes here for the water-based recreational activities. Mark Twain State Park also has one of the most popular campgrounds in the lake area. With 103 mostly wooded campsites, a single-lane boat ramp, modern showers, and facilities designed to be accessible to persons with disabilities, the campground meets the needs of nearly all those wanting a safe, quiet, camping experience. Most of the campground is open year-round; however, the water is turned off between Nov. 1 and March 31. Some campsites can be reserved up to 90 days in advance by calling the park office.

The park also offers numerous picnic sites and two shelter houses for individuals and groups that want to visit for just the day. In fact, one picnic area is named for and adjacent to one of the best-recognized and most photographed landmarks on the shores of Mark Twain Lake – Buzzard's Roost Overlook. This always has been a popular attraction for picnics, weddings,

wide-open views of the lake and for daydreaming.



The more adventurous visitor will find nearly six miles of hiking trails, which begin at Buzzard's Roost and

extend around the campground. These trails range from moderately easy to moderately difficult for the average person. Hiking here affords numerous opportunities to view woodland wildlife and plant life, as well as scenic views of Mark Twain Lake. Surprising to many, Mark Twain State Park contains areas, such as limestone glades, that are more reminiscent of the look and character of the Ozarks.



The park features 103 camping sites for recreational vehicles. Approximately half of the sites have electrical outlets.

Wildlife in the park includes raccoon, opossum, turkey and a wide variety of other mammals, reptiles and birds. It is also common in all four seasons to spot white-tailed deer browsing along park roadsides in the evening. A winter visitor will be thrilled with occasional glimpses of American bald eagles.

For organized youth groups of up to 75 campers, there is the "Si" Colborn Group Camp. The camp provides cabins, showerhouse, a full-service dining hall and outdoor play areas. Camp Colborn is available for reservation by calling the park office. The camp is open from April 1 through Oct. 31 each year.

Dedicated in June 1960, the Mark Twain Birthplace State Historic Site is located in the center of Mark Twain State Park, a quarter-mile south of the village of Florida. The museum is the result of nearly 40 years of effort and cooperation among many people and organizations with the dream of commemorating the location of Mark Twain's birth and to provide a protective shelter for the two-room cabin in which he was born.

The Mark Twain Memorial Shrine museum was constructed in 1959. Clara Clemens Gabrilowitsch selected the museum's design because it symbolized to her a riverboat plowing the waters of the Mississippi. Visitors may share Clara's imagery when they first see the impressive self-supporting roof that covers a portion of the 12,000-sq. ft. museum.

A monument in the village marks the place where Mark Twain's birthplace cabin originally stood. Mark Twain once wrote, "Recently someone in Missouri has sent me a picture of the house I was born in. Heretofore I always stated that it was a palace but I shall be more guarded now." The house was moved to the present location in June 1930. Humble though it may be, the two-room cabin in which Samuel Langhorne Clemens was born on Nov. 30, 1835, has been preserved inside a modern museum filled with artifacts from the Twain era. Measuring only 420 square feet, this small dwelling sheltered eight family members when Samuel was born: John and Jane Clemens;

their five children – Orion, Pamela, Margaret, Benjamin, and the infant Samuel; and Jennie, a teenage slave.

Visitors also can view first editions of Mark Twain's works, a handwritten manuscript of "The Adventures of Tom Sawyer," as well as foreign language editions. The museum contains exhibits of Twain's personal belongings as well as oil paintings of Twain and his family. House furnishings from his Hartford, Conn., home can be found on display in one section of the museum.

Another section is devoted to interpreting life on the Mississippi River, a life Mark Twain knew well, as his pen name (a river term meaning two fathoms) suggests. A full-size replica of a steamboat pilothouse and other symbols of the River Age in America are featured here. There also is a section devoted to interpreting the heroic attempt by residents of early Florida to establish an outstanding city. One such settler was Mark Twain's father, John Marshall Clemens, who took a leading role in the efforts to make Florida a great commercial community.

A public reading room is available for personal study and research. Visitors may also watch a slide presentation on the life of Mark Twain in order to gain a closer look at the man behind the pen.

Visitors may see these exhibits and the birthplace year-round (except New Year's Day, Thanksgiving, and Christmas) from 10 a.m. to 4 p.m. Monday through Saturday, and from noon to 5 p.m. on Sunday. A nominal admission fee is charged. Large groups may want to call in advance to schedule a visit.

Consider combining a visit to Mark Twain Birthplace State Historic Site and Mark Twain State Park with other fun places around the lake and in nearby historic communities. Add rolling hills and the quiet farms of northeast Missouri into the mix and you have an extended visit to one of the Midwest's most interesting regions that even an experienced history buff will enjoy.

For more information, call the site at (573) 565-3449, the park at (573) 565-3440 or the Department of Natural Resources toll free at 1-800-334-6946. Persons with hearing impairments can call 1-800-379-2419 with a Telecommunications Device for the Deaf (TDD).

John Huffman serves as the site administrator at Mark Twain Birthplace State Historic Site. Charles Hesse is the superintendent at Mark Twain State Park.

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TEACHER'S NOTEBOOK

Are We Net-Worthy? You be the Judge

by Ken Brogdon

For eighth-grader Megan Stewart, the Missouri Department of Natural Resources' (DNR) presence on the Internet's World Wide Web is worth visiting more than once.

"It's a cool Web page ... you can go there and get a lot of different information on subjects like air, water and recycling," said Megan, 14, of Willow Springs Middle School after her first visit to the site. "I thought it was easy to find the information you were looking for. I will go there again and check it for science class."

On a monthly basis, students like Megan and thousands of other computer users visit the home page of the department by typing this Web address into a browser – (). Novice users should note that a Web site consists of one or more pages, the first of which is a home page. The home page offers access to additional pages that contain detailed information. Since 1996, DNR's Web site has grown from 50 pages to more than 800 pages. Newsletters, primary statistics on air and water quality, news releases, and profiles of state parks are just the tip of this informational iceberg.

"We started small and built our way up with an eye on the future," said DNR Web Manager Debbie Boeckman. "We have posted information and material that will interest our key audiences."

Included in DNR's key Internet audiences are teachers. Missouri's classrooms have a student per Internet-connected computer ratio of 14 to 1, according to the 1998 Missouri School District Census of Technology. This is down from 24 to 1, the 1997 ratio. Of the 47,500 classrooms in Missouri public schools, more than half have Internet access (26,800). Computer upgrades in Missouri classrooms could not be happening at a better time for students and teachers. A recent study by the International Data Corp. estimated there were almost 30 million Web users in the United States. The study estimated this statistic will triple to 90 million by 2001.



Exponential growth of the Internet is a subject that C.J. Varnon is familiar with. She works with the state's 525 school districts as the science curriculum consultant for the Missouri Department of Elementary and Secondary

Media specialist Pat Bartlett of Jefferson City's Lawson Elementary School helps blend the Internet with the curriculum.

Education. She knows firsthand of the success and frustration that teachers experience using the Internet. "Even though it is growing like wildfire, the Internet is not a classroom substitute for face-to-face interaction with students," she said. "The challenge for teachers is to blend the power and the resources of the Internet into classroom assignments. The challenge for those providing this new technology is to keep it simple and easy to use."

Several features are built into all of DNR's Web pages that attempt to satisfy that critical need for ease-of-use, according to Boeckman. "We have tried to keep it simple at all times. We are aware that not everyone is an Internet wizard," she said.

To counter the clutter, DNR's Web pages feature text fonts that are large and readable. She said that page designers have mimicked the flow of a magazine or newspaper for ease of reading. In addition, there are standard navigation buttons and icons that do not change from page to page. This makes it easier for visitors to move forward and backward through the pages. If a user has questions or concerns, at the bottom of every page is an e-mail address. Since many pages are not much longer than a standard computer screen, it does not take a lot of time to scroll through them.

Boeckman says future additions to the site include a calendar of events, more color photographs and charts, complete versions of *Missouri Resources*, and pages to research past issues of *Missouri Resources* by issue and topic.

For students, Boeckman suggests DNR's "Kids Stuff" page at (/kids.htm). Subject headings here link to DNR pages that specifically target students. The pages include information on topics such as DNR's Earth Day activities, instructions on how to build a hummingbird feeder and how to order trading cards from DNR's Geological Survey and Resource Assessment Division. Via "Kids Stuff," students also can link to pages that feature information on water, air, waste and recycling, state parks and other timely environmental subjects.

As long as computer users like Megan Stewart explore the department's Web site and discover its online benefits, Boeckman anticipates an even greater connection between students, educators and DNR staff.

For more information on the department's Web site, contact Debbie Boeckman at (573) 526-8407 or e-mail her at webmanager@mail.dnr.state.mo.us

Online Offering for Teachers

Developing Internet skills can be a long and winding road for all of us. One of the common roadblocks for busy teachers is finding sites that are relevant and useful in the classroom. With thousands of educational sites already available on the World Wide Web, searches can become very time consuming. In an effort to save time and help teachers get the most out of DNR's Internet site, three Web pages are featured that educators have consistently endorsed. Each links to the rest of the department's expansive menu of Internet pages. Here, instructors will find information that is specifically designed for use in the classroom. The pages also serve as valuable sites for future reference. Teachers may want to add these pages to their list of favorites and share them with other educators.

Listed below, under the title of each Web page is an address and information that briefly describes the site. To find out more about these pages or for additional educational resources on the Internet, call DNR's Environmental Assistance Office at (573) 751-6627 or send e-mail to EO@mail.dnr.state.mo.us.

Environmental Education Courses

(</oac/edcourse.htm>)

The department offers environmental education courses for teachers on a variety of topics. "Waste Reduction Education: Curriculum and Kids" and "Stream Environments" are among classes to be offered by DNR during the spring and summer of 1999. This web page includes a registration form, course descriptions and listings, and information on tuition.

Environmental Education Publications

(</oac/edpubs.htm>)

A concise listing of publications and videos, pricing information, and links to order forms and related topic sites are among the items found here. All environmental education publications and videos are designated for school teachers and educators (Missouri residents only).

Project W.E.T.(Water Education for Teachers)

(</oac/wetww.htm>)

This site features a science activity for students on the use of water in everyday life and a detailed feature story on Project WET from the Spring 1996 issue of Missouri Resources. A related department page presents a Missouri map that lists counties where Project WET facilitators can be found. Contact the state coordinator for specific facilitator information. The address is (<http://www.dnr.state.mo/oac/pwetmap.htm>).